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Joan M. Donohue, Ernest C. Houck, Raymond H. Myers
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3 A sequential experimental design procedure for the estimation of first- and second-order simulation metamodels
Joan M. Donohue, Ernest C. Houck, Raymond H. Myers
July 1993 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Volume 3 Issue 3
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Keywords: metamodels, variance reduction techniques

4 Some optimal simulation designs for estimating quadratic response surface functions
Joan M. Donohue, Ernest C. Houck, Raymond H. Myers
December 1990 **Proceedings of the 22nd conference on Winter simulation**
Publisher: IEEE Press
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5 Variance reduction methods

Russell C. H. Cheng
December 1986 **Proceedings of the 18th conference on Winter simulation**
Publisher: ACM Press

Full text available: pdf(886.71 KB) Additional Information: full citation, abstract, references, citings, index terms

A computer simulation model is unusual in that the random error is under the total control of the experimenter. Variance reduction methods aim to take advantage of this to improve experimental accuracy. The fundamental ideas behind the most important of these methods will be described and illustrated with simple examples.

6 Semiconductor manufacturing: Implementation of response surface methodology using variance reduction techniques in semiconductor manufacturing

Charles D. McAllister, Bertan Altuntas, Matthew Frank, Juergen Potoradi
December 2001 **Proceedings of the 33nd conference on Winter simulation**
Publisher: IEEE Computer Society
Full text available: pdf(222.81 KB) Additional Information: full citation, abstract, references, index terms

Semiconductor manufacturing is generally considered a cyclic industry. As such, individual producers able to react quickly and appropriately to market conditions will have a competitive advantage. Manufacturers who maintain low work in process inventory, ensure that specialized equipment is in good repair, and produce quality products at least possible cost will have the best opportunities to effectively compete and excel in these challenging venues. To support this nimble business model, our cu ...

7 The use of variance reduction techniques in the estimation of simulation metamodels

Joan M. Donohue
December 1995 **Proceedings of the 27th conference on Winter simulation**
Publisher: ACM Press
Full text available: pdf(702.49 KB) Additional Information: full citation, references, index terms

8 Metamodeling: a state of the art review

Russell R. Barton
December 1994 **Proceedings of the 26th conference on Winter simulation**
Publisher: Society for Computer Simulation International
Full text available: pdf(864.01 KB) Additional Information: full citation, references, citings, index terms

9 Advanced tutorials: Design of experiments: robust design: seeking the best of all possible worlds

Susan M. Sanchez
December 2000 **Proceedings of the 32nd conference on Winter simulation**
Publisher: Society for Computer Simulation International
Full text available: pdf(76.34 KB) Additional Information: full citation, abstract, references, citings

We describe a framework for analyzing simulation output in order to find solutions that will work well after implementation. We show how the use of a loss function that incorporates both system mean and system variability can be used to efficiently and effectively carry out system optimization and improvement efforts. For models whose behavior depends on quantitative factors, we illustrate how robust design can be accomplished by using simple experimental designs in conjunction with response-sur ...

10 A robust design tutorial
Susan M. Sanchez
December 1994 **Proceedings of the 26th conference on Winter simulation**
Publisher: Society for Computer Simulation International
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11 Monotonic generation of positive random variables
Louis R. Moore
December 1983 **Proceedings of the 15th conference on Winter simulation - Volume 1**
Publisher: IEEE Press
Full text available: pdf(181.86 KB) Additional Information: full citation, abstract, references, citings, index terms

This paper presents methods to invert efficiently the distribution function of an arbitrary positive random variable. Such methods preserve the monotonic relationship between the random variable and the uniform deviate which generates it. This relationship is necessary to reduce the variance of an estimator in simulation experiments. For discrete distributions, an indexed search method is employed utilizing variable spaced cutpoints. For continuous distributions, a piecewise continuous incr ...

12 Simulation metamodels
Russell R. Barton
December 1998 **Proceedings of the 30th conference on Winter simulation**
Publisher: IEEE Computer Society Press
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13 Designing pseudo-random number assignment strategies for simulation experiments
Wheyming Tina Song, Chien-Chou Su
December 1995 **Proceedings of the 27th conference on Winter simulation**
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14 Estimation and simulation of nonhomogeneous Poisson processes having multiple periodicities
Michael E. Kuhl, James R. Wilson, Mary A. Johnson
December 1995 **Proceedings of the 27th conference on Winter simulation**
Publisher: ACM Press
Full text available: pdf(869.59 KB) Additional Information: full citation, references, citings, index terms

15 Advanced tutorials: Software for uniform random number generation: distinguishing the good and the bad
Pierre L'Ecuyer
December 2001 **Proceedings of the 33nd conference on Winter simulation**
Publisher: IEEE Computer Society
Full text available: pdf(175.96 KB) Additional Information: full citation, abstract, references, citings, index terms

The requirements, design principles, and statistical testing approaches of uniform random

number generators for simulation are briefly surveyed. An object-oriented random number package where random number streams can be created at will, and with convenient tools for manipulating the streams, is presented. A version of this package is now implemented in the *Arena* and *AutoMod* simulation tools. We also test some random number generators available in popular software environments such ...

16 Sensitivity analysis and optimization in simulation: design of experiments and case studies

Jack P. C. Kleijnen
December 1995 **Proceedings of the 27th conference on Winter simulation**
Publisher: ACM Press
Full text available: pdf(750.93 KB) Additional Information: full citation, references, citings, index terms

17 Metamodels for simulation input-output relations

Russell R. Barton
December 1992 **Proceedings of the 24th conference on Winter simulation**
Publisher: ACM Press
Full text available: pdf(1.17 MB) Additional Information: full citation, references, citings, index terms

18 Recent advances in simulation for security pricing

Phelim Boyle, Mark Broadie, Paul Glasserman
December 1995 **Proceedings of the 27th conference on Winter simulation**
Publisher: ACM Press
Full text available: pdf(839.88 KB) Additional Information: full citation, references, citings, index terms

19 A Macroscopic Behavior Model for Self-Timed Pipeline Systems

Shuji Sannomiya, Yoichi Omori, Makoto Iwata
June 2003 **Proceedings of the seventeenth workshop on Parallel and distributed simulation**
Publisher: IEEE Computer Society
Full text available: pdf(238.09 KB) Publisher Site Additional Information: full citation, abstract, index terms

This paper presents a novel macroscopic behavior modelfor self-timed pipeline (STP). STP is a promising architecturefor system-on-chip (SoC) design, because STP easesthe timing problems and abnegates the control dependenciesamong building components to prevent the parallelismand integrity. In earlier evaluation processes, a cycle-basedsimulation takes too long and too much memory to surveythe wandering behavior of STP. From the theoretical pointof view, throughput of a STP system depends on the ...

20 Experimental designs for simulation

Joan M. Donohue
December 1994 **Proceedings of the 26th conference on Winter simulation**
Publisher: Society for Computer Simulation International
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worse than the original data. Given the exploratory intent of the study, the results do support two lines of further inquiry: 1) There is evidence of a Type DM bias and 2) There is evidence that an approach such as GADP-W may be useful in increasing data mining accuracy when a data set possesses 'outliers'.

This study did find initial evidence that a Type DM bias does exist, and perhaps other phenomenon which data perturbation techniques place on knowledge discovery processes. As an introductory study, perhaps more questions were posed than were answered. Nonetheless, the need for both strong knowledge discovery tools and data privacy and security in the quest for continued e-commerce success makes this interdisciplinary research area worth pursuing in much more detail.

ACKNOWLEDGEMENTS

The authors would like to thank Dr. Ira G., Wayne, Brooke and Laura Rosen for their support and contributions to this paper.

REFERENCES

Ashley, D. W. (1996). A Canonical Correlation Procedure for Spreadsheets. *Proceedings, 27th Annual Meeting of the Decision Sciences Institute*, 1102-1109.

Graybill, F.A. (1976). *Theory and Application of the Linear Model.* North Scituate: Duxbury Press.

Kim, J. (1986). A Method for Limiting Disclosure in Microdata Based on Random Noise and Transformation. *ASA Proceedings Survey Research Methods*. 370-374.

Lim, T. S., Low, W. Y., & Shih, Y. S. (2000). A Comparison of Prediction Accuracy, Complexity, and Training Time of Thirty-Three Old and New Classification Algorithms. *Machine Learning, 40*, 203-229.

Low, W. Y., Shih, Y. S. (1997). Split Selection Methods for Classification Trees. *Statistica Sinica, 7*, 815-840.

Matsumoto, M., & Nishimura, T. (1998). Mersenne Twister: A 623-Dimensionally Equidistributed Uniform Pseudorandom Number Generator. *ACM Transactions on Modeling and Computer Simulation, 8(1)*, 3-30.

Merz, C. J., & Murphy, P. M. (1996). *UCI Repository of Machine Learning Databases.* Retrieved July 14, 2001 from University of California, Irvine, Department of Information and Computer Science site: http://www.ics.uci.edu/~mlearn/MLRepository.html

Muralidhar, K., Parsa, R., & Sarathy, R (1999). A General Additive Data Perturbation Method for Database Security. *Management Science, 45(10)*, 1399-1415.

Muralidhar, K., Batra, D., & Kirs, P. (1995). Accessibility, security and accuracy in statistical databases: The case for the multiplicative fixed data perturbation approach. *Management Science, 41(9),* 1549-1564.

Numerical Technologies Random Generator for Excel (NtRand). Retrieved July 17, 2001, from Numerical Technologies Corporation site: http://numtech.com/documents/19981222/index.htm

Tendick, P. (1991). Optimal Noise Addition for Preserving Confidentiality in Multivariate Data. *Journal of Statistics Planning and Inference. 27(2),* 341-353.

Tendick, P., & Matloff, N. (1994). A Modified Random Perturbation Method for Database Security. *ACM Transcations on Database Systems, 19(1),* 47-63.

Weiss, S., & Kulikowski, C. (1991). *Computer Systems that Learn.* San Mateo: Morgan Kauffman.

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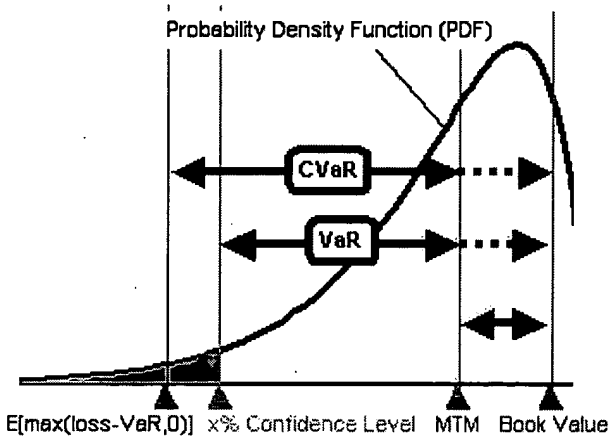
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October 7, 1999

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We also agreed to make risk management research teamed with Mitsubishi Trust & Banking Corp. and MTEC (MTB Investment Technology Institute Co., Ltd.). Also, we begin to support CVaR (Conditional VaR, mean expected loss, expected shortfall below capital) and Marginal CVaR from new version of CreditBrowser® shipped October 7.



Functional comparison across typical credit risk models

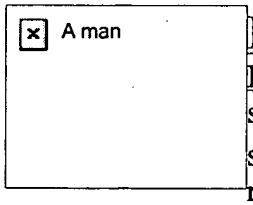
	CreditBrowser®	CreditMetrics (J.P.Morgan / RMG)	CreditRisk+ (CSFP)
Theory	Merton	Merton	Actuarial
Computation	Simulation	Simulation	Analytic
Output	VaR, Marginal VaR, CVaR, Marginal CVaR, RAROC, RAROA, etc.	VaR, Marginal VaR, etc.	VaR, etc.
Evaluation by transaction			
MTM	Yes	Yes	No

What's New

- October 7, 1999 - CreditBrowser® Version 2.4 has shipped. CVaR and marginal CVaR has been incorporated.
- September 21, 1999 - A presentation of case studies at the Operations Reserch Society of Japan.
- August 20, 1999 - CreditBrowser® Version 2.2 released and shipped for Sumitomo Bank, Co. Ltd., offering economic indicators-linked collateral covering ratio, and more new and powerful features.
- August 11, 1999 - Mitsubishi Trust & Banking Corp. adopted CreditBrowser®.
- August 4, 1999 - CreditBrowser® new version, featuring the model verification is released.

DM	Yes	No	Yes
Yield spread based on credit rating and recovery rate			
Fixed value input	Yes	Yes	No (unenterable)
Internal model	Yes (for the loan of which spread is not accessible)	No	No (unenterable)
Correlation by obligor			
Country / industry sector	Yes	Yes	No (on the implicit assumption by model and inoperable)
Economic indicators	Yes	No	No
Financial / business ties	Yes (up to 3 parent companies definable for a single corporate	No	No
LGD (loss given in default)			
Fixed ratio input	Yes	No	Yes
Beta distribution	Yes	Yes	No
Truncated normal distribution	Yes	No	No
Indicator link	Yes (e.g., real estate price)	No	No
Multi-period	Yes (absorptive Marcov chain,up to 30 yrs in an increment of 1 yr)	No	No
Rollover	Yes (support for short-term loans)	No	No
Market risk	Risk of individual stock incorporated in (Merton and VaR models implemented).	No	No
Scenario simulation	Yes (expected growth rate to be input per country, sector, and indicator)	No	No

(Note) Yes: available/selectable. No: not available



Product Highlight

ForcePlus - a market risk management system provided in partnership with the system vendor, CreditBrowser® - a credit risk management system that enables you

- July 7, 1999 - New document covering the feature story "Internal modeling in association with a new Capital Accord." For details, click here.
- July 1, 1999 - 1999 - Mr. Yoshikazu Tsutsui joined the board of directors. On the same day, Numerical Technologies' capital increased to JPY 50 million.
- June 18, 1999 - CreditBrowser® comes with Linux flavor. See the benchmark result.
- June 3, 1999 - A new capital adequacy framework to replace the 1988 Accord has released from the Basel Committee on Banking Supervision. Visit the BIS web site for details.
- April 27, 1999 - "Credit Risk Management Seminar" was held under the sponsorship of Oracle Japan. It is needless to say that, Japan is one of the most *advanced* country concerning the credit risk issues in the world now. In this seminar, we examined today's credit risk management techniques, especially credit VaR (Value at Risk) and internal credit risk modeling, as a specialist of commercial bank's credit problems in Japan. For details,

to run the simulation and to manage credit VaR (Value at Risk) on a scale of the whole portfolio of the world's biggest financial institution, and DataBrowser™ - a powerful template for information system. Click here for details of each product. Particularly, CreditBrowser® is fully revised and redesigned from the Version 1.5 released in October, 1998, and incorporates three credit risk models in it. The strongest point of CreditBrowser is its built-in credit spread model. This makes you free from relying on the corporate bond spread (like J. P. Morgan's CreditMetrics) unavailable outside the U.S. market as well as enhances the support for the domestic credits. The credit spread model is expected to apply for customer loan spread calculation.

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We provide lots of open documents describing various topics regarding financial risk management, system development, and numerical calculation. Click here for the contents. Should you need it in printed form, please ask us by e-mail. Our freeware of multivariate Monte Carlo **NtRand** for Microsoft Excel add-in which implements Mersenne Twister, a pseudorandom number generator of far longer period and far higher order of equidistribution than any other implemented generators (proved that the period is $2^{19937}-1$, and 623-dimensional equidistribution property is assured), is also downloadable. A practical Monte Carlo value at risk (VaR) system can be built, if it is on a smaller scale, just using the Excel with **NtRand**. Just give it a try if you are intrigued in multivariate Monte Carlo simulation and moment matching method.



click here.

April 22, 1999 - CreditBrowser® Version 2.1 is released. This feature-rich version covers the whole capability of J.P.Morgan's CreditMetrics, implementing both the DM and MTM approaches defined by the Basle Committee on Banking Supervision as well as the multi-period Monte Carlo, OLAP data drilling down, credit spread models (enable you to evaluate loans made in non-U.S. countries where the corporate bond spread is inaccessible), and an ultra high-speed processing - just in 2 hours to calculate a large commercial bank's corporate loan portfolio (with 50,000 obligors, 150,000 transactions, and over 100,000 combinations of managing accounts by OLAP through the 10000-time Monte Carlo full valuation simulation). For details, click here.

April 2, 1999 - Lecture on "Random Number Technology in Financial Risk Management - description of inter-elemental chain property in very high order and multi-period modeling" was presented at the symposium in commemoration of the foundation of the Center for Research in Advanced Financial Technology

at Tokyo Institute of Technology. To obtain the documentation in print, click here.

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Mersenne Twister Home Page

(A random number generator)

Four times faster than rand()

Of period 219937-1**

Japanese Version
Note: please send email when you use this random number generator: we shall try to inform you of future possible improvements. Please let us know if you find any kind of problem on this generator.

Caution: MT is for MonteCarlo, and is NOT SECURE for CRYPTOGRAPHY as it is. See the following Frequently Asked Question.

A list of news since 00/July- New! New!

A list of news since 99/May- New! New! (00/Feb./13) contains: A quicker full-featured JAVA class (Sean Luke), Glib library (Sebastian Wilhelmi), Fortran 90 (Richard Woloshyn), Clean (Thorsten Zoerner), C++ (Martin Hinsh, Rene Brun), GNU Octave (Dirk Eddelbuettel), Assembler for Pentium (Shin-ichi Tsuruta), T800 in Squeak version of Small talk (David N. Smith), Object Pascal code Delph (Roman Krejci), SmallEiffel (Arno Wagner), Fortran (Alan Miller), Lua (Dave Bollinger), Python (Ivan Frohne, Darrell Gallion), REALbasic for Mac (Japanese Explanation included, by Kenji Gotoh),

Haskell-Language Version by M. Harden New! 99/May./31

A Java version by W. Hoschek New! 99/May./31

Excel implemention by H. Torii New! 99/May./31

Fortran version New! 99/Jan./14

Mersenne twister in PHP for html New! 98/Dec./22

Mersenne Twister in JAVA (non-Japanese version) ('98/Aug/15th)

Twice faster !! Shawn J. Cokus's version (four times faster than rand()!!!), other versions, outputs, click here ('98/Apr/9th)

Standard MT codes and outputs, 99/10/29 version (initialization modified) click here ('99/10/29) New! New!

A link to a Java class of MT (Japanese only) ('98/Feb/18th)

Slightly Modified C-code ('97/Dec/6th)

What is Mersenne Twister?

Mersenne Twister(MT) is a pseudorandom number generator developped by Makoto Matsumoto and Takuji Nishimura (alphabetical order) during 1996-1997. MT has the following merits:

- It is designed with consideration on the flaws of various existing generators.
- The algorithm is coded into a C source downloadable below.
- Far longer period and far higher order of equidistribution than any other implemented generators. (It is proved that the period is 2^19937-1, and 623-dimensional equidistribution property is assured.)
- Fast generation. (Although it depends on the system, it is reported that MT is sometimes faster than the standard ANSI-C library in a system with pipeline and cache memory.)
- Efficient use of the memory. (The implemented C-code mt19937.c consumes only 624 words of working area.)

Asks and acknowledgements
The origin of the name MT

Why MT? More Reasons

- Mathematical/Computational reasons
- Reputations by some researchers
- Reputations by some users

The scientific paper on MT

is below. If you have a difficulty in downloading .ps file, send an email to e-mail: nisimura@comb.math.keio.ac.jp.

- mt.ps M. Matsumoto and T. Nishimura, "Mersenne Twister: A 623-dimensionally equidistributed uniform pseudorandom number generator", ACM Trans. on Modeling and Computer Simulation Vol. 8, No. 1, Januray pp.3-30 1998
- Compressed gzip file of mt.ps mt.ps.gz
- .pdf file of mt.ps mt.pdf

C codes

The implemented C-code([0,1]-interval mt19937.c)

Unsigned 32-bit integer version mt19937int.c
Twice faster !! Shawn J. Cokus's version (four times faster than rand()!!!), other versions, outputs, click here ('98/Apr/9th)

Standard MT codes and outputs, 99/10/29 version (initialization modified) click here ('99/10/29) New! New!

- A brief discription of the code
- Frequently asked questions

FORTRAN codes

Hiroshi Takano at Department of Physics at Keio Univ. kindly wrote Fortran versions: mt19937.f for real mt19937int.f for integer. These codes yielded the same output as C-code in f77 and f90 on HP-UX 10.20, g77 on SunOS 4.1.4, and f77 on NEWS-OS 4.2.1R, but yet to be tested.

Heinrich Stamerjohanns reported some problems of the above fortran code in IBM AIX, CRAY T3E. He gave a modified code: see News July 2000-. Fortan90 version is available, too. See News July 1999-.

Frequently asked questions

- Frequently asked questions

references

Articles on Twisted GFSR, an ancestor of MT.

- M. Matsumoto and Y. Kurita, "Twisted GFSR generators", ACM Trans. on Modeling and Computer Simulation, 2(1992),179--194
- M. Matsumoto and Y. Kurita, "Twisted GFSR generatos II", ACM Trans. on Modeling and Computer Simulation, 4(1994),254--266 Its .tex file

A newspaper reported MT

A Japanese Newspaper "ASAHI" reported MT in the evening news on Oct. 27th, 1997.

Links

- A macro-implementation of mt19937.c This was coded by Marc Rieffel, who used MT for his plasma simulation team. The code uses MACROs instead of function call, and it results in 30% speed-up of the code mt19937.c above. It also considers paralellization. Since it uses macro, one needs to include the package, instead of linking the object. The http site of their project HAWK has a page of MT.
- pLab Home page (random number research team in Salzburg University)
 - This site reported MT as a news. A previous twisted generator TT800 is tested in their study, and shows a successful result. (A source code of TT800 is downloadable from NEWS of the site.)
 This site gives C-codes of the previous version of MT. real, integer) The codes here are essentially same with mt19937.c, but this Salzburg version output the initialized vector whereas the new version mt19937.c above does not. Also the new version uses a default value if the initial seed is not given.
- The comittee of CMU Common LISP decided to adopt a modified MT19937 as a random number package in CMU Common LISP. A lisp version rand-mt19937.lisp is available. (New!)
- A large part of the article on MT is written at the Max-Planck-Institute for Mathematics in Bonn during Matsumoto's stay there. The preprint server there gives a previous version (.ps file) of the manuscript, which contains more criticisms.
- Yumae, S. at Financial Research Department, NLI Research Institute, wrote a Java class implementing many random number generators including MT. See his page (mainly in Japanese).
- John Cooke kindly implemented MT on BeOS as a C++ class which is derived from an abstract base class called RNG which is used for all RNGs. Look into his homepage for libraries for RNG, permutation, etc.
- Secure Keystreams algorithm ORCA by David Oshel adopted MT as its internal random number generator.
- Bote (Chat, send PopUp Notes, Voice, Messages and Files or Folders):
 Mersenne Twister has another acknowlwedgement in "Bote" by David Binette. He said: "After discovering the dismal performance of the rand() function in Microsoft Visual C I Was delighted to find the Twister and its exceedingly long interval. I have created and publish a guified version that allows three 32 bit keys. The link above will show the screen snapshot and link to the program."
- B. Narasimhan kindly wrote a Java version which is available for non-Japanese, too. See his programs.
- Kristian Koentopp at SH Online Dienst GmbH let us know a PHP version of MT: "Pedro Melo has written the necessary patches to make the Mersenne twister part of the PHP language. It is now available as the functions mt_rand(), mt_srand() and mt_getrandmax() to PHP language users as a random number generator with known mathematical properties and independent of what the libc provides. I have integrated the code and committed the changes to the CVS. The PHP mailing list can be reached at php3@lists.php.net, the PHP website is at http://web.archive.org/web/20000817023809/http://www.php.net/."
- Kenji Rikitake kindly produced and using a CD-R of random noize for testing audio machines and composing sound waves for music. It contains 90Mbyte ouput of the MT.
- Numerical Technology Inc. implemented MT in Excel Addin. (1999/May/30)
- Matt Harden kindly made a MT19937 code in Haskell language available. (1999/May/31)
- Wolfgang Hoschek at CERN IT DIVISION kindly wrote a Java version as a part of the free Colt library. (1999/May/31)

Go to the home page of Makoto Matsumoto
e-mail: matumoto@math.keio.ac.jp
Last Modified: May 31st, 1999
http://www.mpim-bonn.mpg.de/MPI-97-89.ps preprint

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1 Mersenne twister: a 623-dimensionally equidistributed uniform pseudo-random number generator
Makoto Matsumoto, Takuji Nishimura
January 1998 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Volume 8 Issue 1
Publisher: ACM Press
Full text available: pdf(247.73 KB) Additional Information: full citation, abstract, references, citings, index terms

A new algorithm called Mersenne Twister (MT) is proposed for generating uniform pseudorandom numbers. For a particular choice of parameters, the algorithm provides a super astronomical period of 219937 −1 and 623-dimensional equidistribution up to 32-bit accuracy, while using a working area of only 624 words. This is a new variant of the previously proposed generators, TGFSR, modified so as to admit a Mersenne-prime period. The characteristic polynomial has many t ...

Keywords: k-distribution, m-sequences, GFSR, MT19937, Mersenne primes, Mersenne twister, TGFSR, finite fields, incomplete array, inversive-decimation method, multiple-recursive matrix method, primitive polynomials, random number generation, tempering

2 The Use of Index Calculus and Mersenne Primes for the Design of a High-Speed Digital Multiplier
Aviezri S. Fraenkel
January 1961 **Journal of the ACM (JACM)**, Volume 8 Issue 1
Publisher: ACM Press
Full text available: pdf(477.60 KB) Additional Information: full citation, references, citings, index terms

3 Tables of 64-bit Mersenne twisters
Takuji Nishimura
October 2000 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Volume 10 Issue 4
Publisher: ACM Press
Full text available: pdf(79.56 KB) Additional Information: full citation, abstract, references, citings, index terms

We give new parameters for a Mersenne Twister pseudorandom number gene rator for 64-

bit word machines.

Keywords: 64-bit, k-distribution, Mersenne Twister, finite fields, linear recurrence, random rumber generation

4 Fast and reliable random-number generation

Aaldert Compagner
December 1992 **Proceedings of the 24th conference on Winter simulation**
Publisher: ACM Press
Full text available: pdf(567.83 KB) Additional Information: full citation, references, index terms

5 Quasi-Random Number Sequences from a Long-Period TLP Generator with Remarks on Application to Cryptography

Herbert S. Bright, Richard L. Enison
December 1979 **ACM Computing Surveys (CSUR)**, Volume 11 Issue 4
Publisher: ACM Press
Full text available: pdf(1.18 MB) Additional Information: full citation, references, citings, index terms

6 A novel cache design for vector processing

Qing Yang, Liping Wu Yang
April 1992 **ACM SIGARCH Computer Architecture News , Proceedings of the 19th annual international symposium on Computer architecture ISCA '92**, Volume 20 Issue 2
Publisher: ACM Press
Full text available: pdf(1.35 MB) Additional Information: full citation, abstract, references, citings, index terms

This paper introduces an innovative cache design for vector computers, called prime-mapped cache. By utilizing the special properties of a Mersenne prime, the new design does not increase the critical path length of a processor, nor does it increase the cache access time as compared to a direct-mapped cache. The prime-mapped cache minimizes cache miss ratio caused by line interferences that have been shown to be critical for numerical applications by previous investigators. We show that sig ...

7 Simple cellular automata as pseudorandom m-sequence generators for built-in self-test

Makoto Matsumoto
January 1998 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Volume 8 Issue 1
Publisher: ACM Press
Full text available: pdf(116.48 KB) Additional Information: full citation, abstract, references, citings, index terms

We propose an extremely simple and explicit construction of cellular automata (CA) generating pseudorandom m-sequences, which consist of only one type of cells. This construction has advantages over the previous researches in the following points. (1) There is no need to search for primitive polynomials; a simple sufficient number-theoretic condition realizes maximal periodic CA with periods 2m − 1, m =2, 3, 5, 89 ...

Keywords: m-sequence, VLSI, cellular automata, finite fields, pseudorandom number generation

8 The prime internet eisenstein search

Bob Bruen, Phil Carmody
August 2005 **Linux Journal**, Volume 2005 Issue 136
Publisher: Specialized Systems Consultants, Inc.
Full text available: html(18.68 KB) Additional Information: full citation, abstract, index terms

2, 3, 5, 7...pretty soon you're talking big numbers. Fire up your Linux box and join the quest.

9 Shift-register sequence random number generators on the hypercube conurrent computers

T-W. Chiu
January 1989 **Proceedings of the third conference on Hypercube concurrent computers and applications - Volume 2**
Publisher: ACM Press
Full text available: pdf(820.19 KB) Additional Information: full citation, abstract, references, citings, index terms

We discuss the design of a class of shift-register sequence random number generators for the MIMD parallel computers, and particularly for the hypercube concurrent computers. The simplest implementation is to have each processor generating its own sequence provided that the initial seeds are linearly independent. We generate these initial seeds by using distinct linear congruential generators and finally bit-by-bit-exclusive-or with the system time in microseconds. Our shift-register sequen ...

10 Random number generation with primitive pentanomials

Pei-Chi Wu
October 2001 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Volume 11 Issue 4
Publisher: ACM Press
Full text available: pdf(76.19 KB) Additional Information: full citation, abstract, references, index terms

This paper presents generalized feedback shift register (GFSR) generators with primitive polynomials $x^p + x^{p-1} + x^q + x^{q-1} + 1$. The recurrence of these generators can be efficiently computed. We adopt Fushimi's initialization scheme, which guarantees the k-distribution property. Statistical and timing results are presented.

Keywords: Primitive trinomials, generalized feedback shift register

11 Coding the Lehmer pseudo-random number generator

W. H. Payne, J. R. Rabung, T. P. Bogyo
February 1969 **Communications of the ACM**, Volume 12 Issue 2
Publisher: ACM Press
Full text available: pdf(334.77 KB) Additional Information: full citation, abstract, references, citings, index terms

An algorithm and coding technique is presented for quick evaluation of the Lehmer pseudo-random number generator modulo 2 ** 31 - 1, a prime Mersenne number which produces 2 ** 31 - 2 numbers, on a p-bit (greater than 31) computer. The computation method is extendible to limited problems in modular arithmetic. Prime factorization for 2 ** 61 - 2 and a primitive root for 2 ** 61 - 1, the next largest prime Mersenne number, are given for possible construction of a pseudo-rand ...

Keywords: modular arithmetic, prime factorization, primitive roots, pseudo-random number, random number, simulation, uniform frequency function, uniform probability

density

12 Beware of linear congruential generators with multipliers of the form a = ±2q ±2r

Pierre L'Ecuyer, Richard Simard
September 1999 **ACM Transactions on Mathematical Software (TOMS)**, Volume 25 Issue 3
Publisher: ACM Press

Full text available: pdf(102.05 KB) Additional Information: full citation, abstract, references, citings, index terms, review

Linear congruential random-number generators with Mersenne prime modulus and multipliers of the form a = ±2q ±r have been proposed recently. Their main advantage is the availability of a simple and fast implementation algorithm for such multipliers. This note generalizes this algorithm, points out statistical weaknesses of these multipliers when used in a straightforward manner, and s ...

Keywords: correlation test, linear congruential generators, random number generation

13 Javelin++: scalability issues in global computing

Michael O. Neary, Sean P. Brydon, Paul Kmiec, Sami Rollins, Peter Cappello
June 1999 **Proceedings of the ACM 1999 conference on Java Grande**
Publisher: ACM Press
Full text available: pdf(1.34 MB) Additional Information: full citation, references, citings, index terms

14 Algorithm 806: SPRNG: a scalable library for pseudorandom number generation

Michael Mascagni, Ashok Srinivasan
September 2000 **ACM Transactions on Mathematical Software (TOMS)**, Volume 26 Issue 3
Publisher: ACM Press

Full text available: pdf(158.69 KB) Additional Information: full citation, abstract, references, citings, index terms

In this article we present background, rationale, and a description of the Scalable Parallel Random Number Generators (SPRNG) library. We begin by presenting some methods for parallel pseudorandom number generation. We will focus on methods based on parameterization, meaning that we will not consider splitting methods such as the leap-frog or blocking methods. We describe, in detail, parameterized versions of the following pseudorandom number generators: (i) linear congruential generators, ...

Keywords: lagged-Fibonacci generator, linear congruential generator, parallel random-number generators, random-number software, random-number tests

15 On the xorshift random number generators

François Panneton, Pierre L'ecuyer
October 2005 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Volume 15 Issue 4
Publisher: ACM Press
Full text available: pdf(193.79 KB) Additional Information: full citation, abstract, references, index terms

G. Marsaglia recently introduced a class of very fast *xorshift* random number generators, whose implementation uses three "xorshift" operations. They belong to a large family of generators based on linear recurrences modulo 2, which also includes shift-register generators, the Mersenne twister, and several others. In this article, we analyze the theoretical properties of xorshift generators, search for the best ones with respect to the

equidistribution criterion, and test them ...

Keywords: Random number generation, linear feedback shift register, linear recurrence modulo 2, xorshift

16 HAVEGE: A user-level software heuristic for generating empirically strong random numbers

André Seznec, Nicolas Sendrier
October 2003 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Volume 13 Issue 4
Publisher: ACM Press
Full text available: pdf(122.28 KB) Additional Information: full citation, abstract, references, index terms

Random numbers with high cryptographic quality are needed to enhance the security of cryptography applications. Software heuristics for generating empirically strong random number sequences rely on entropy gathering by measuring unpredictable external events. These generators only deliver a few bits per event. This limits them to being used as seeds for pseudorandom generators.General-purpose processors feature a large number of hardware mechanisms that aim to improve performance: caches, branch ...

Keywords: Cryptography, hardware clock counters, random number generation, superscalar processor

17 Advanced tutorials: Software for uniform random number generation: distinguishing the good and the bad

Pierre L'Ecuyer
December 2001 **Proceedings of the 33nd conference on Winter simulation**
Publisher: IEEE Computer Society
Full text available: pdf(175.96 KB) Additional Information: full citation, abstract, references, citings, index terms

The requirements, design principles, and statistical testing approaches of uniform random number generators for simulation are briefly surveyed. An object-oriented random number package where random number streams can be created at will, and with convenient tools for manipulating the streams, is presented. A version of this package is now implemented in the *Arena* and *AutoMod* simulation tools. We also test some random number generators available in popular software environments such ...

18 Genetic algorithms: Genetic algorithms using low-discrepancy sequences

Shuhei Kimura, Koki Matsumura
June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**
Publisher: ACM Press
Full text available: pdf(163.35 KB) Additional Information: full citation, abstract, references, index terms

The random number generator is one of the important components of evolutionary algorithms (EAs). Therefore, when we try to solve function optimization problems using EAs, we must carefully choose a good pseudo-random number generator. In EAs, the pseudo-random number generator is often used for creating uniformly distributed individuals. As the low-discrepancy sequences allow us to create individuals more uniformly than the random number sequences, we apply the low-discrepancy sequence generator ...

Keywords: genetic algorithm, low-discrepancy sequence, pseudo-random number sequence, random number generator

19 Simulation education: Tools for teaching simulation: integrating modelling and data analysis in teaching discrete event simulation

Krzysztof Pawlikowski, Wolfgang Kreutzer

December 2000 **Proceedings of the 32nd conference on Winter simulation**

Publisher: Society for Computer Simulation International

Full text available: pdf(216.76 KB) Additional Information: full citation, abstract, references

The growing popularity of stochastic discrete event simulation in areas such as telecommunication, combined with much marketing hype about ease of use, has coaxed some practitioners into a misguided belief that choosing prefabricated components from libraries and configuring them into a model by pointing and clicking is all that is needed. While neglect of statistical aspects of simulation has already led to some highly problematic published results, this erroneous assumption must also be guarde ...

20 Departments: News 2.0

February 2004 **Queue**, Volume 1 Issue 10

Publisher: ACM Press

Full text available: pdf(74.83 KB) html(4.51 KB) Additional Information: full citation, index terms

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